

AMENDMENTS TO THE CLAIMS

This listing of claims shall replace all previous listings, and versions, of claims in this application.

Listing of Claims:

Claim 1 (currently amended) A non-contact position sensor comprising:

a plurality of sensor elements comprising Hall effect sensors configured in an array; each said sensor element configured to provide an output associated with each of a plurality of positions of a sensor control element, said sensor control element comprising a magnet, relative to said array of sensor elements, whereby a separate combination of said outputs is provided for each of said positions; and

a biasing magnet mounted in a fixed position adjacent at least one of said sensor elements for biasing said at least one of said sensor elements to a selected output.

Claim 2 (original) A sensor according to claim 1, wherein said sensor elements are configured in a linear array.

Claim 3 (previously presented) A sensor according to claim 2, wherein each said sensor element is configured to provide an associated output in response to movement of said sensor control element along said linear array to each of said plurality of positions.

Claim 4 (original) A sensor according to claim 2, wherein each said sensor element is configured to provide an associated output in response to movement of said sensor control element across said array to each of said plurality of positions.

Claim 5 (original) A sensor according to claim 1, wherein said sensor elements are configured in an arcuate array.

Claim 6 (cancelled)

Claim 7 (cancelled)

Claim 8 (previously presented) A sensor according to claim 1, wherein said magnet has a generally arcuate shape.

Claim 9 (original) A sensor according to claim 8, wherein said array is a linear array.

Claim 10 (previously presented) A sensor according to claim 1, wherein said magnet has a length greater than a distance between adjacent ones of said Hall effect sensors.

Claim 11 (previously presented) A sensor according to claim 1, wherein at least one of said Hall effect sensors comprises first and second Hall elements; each of said Hall elements providing an associated output in response to a position of said sensor control element relative to said position sensor.

Claim 12 (previously presented) A sensor according to claim 1, wherein said magnet is a coded magnet comprising at least one North magnetized region and at least one South magnetized region.

Claim 13 (previously presented) A sensor according to claim 12, wherein said coded magnet comprises said at least one North magnetized region disposed adjacent said at least one South magnetized region.

Claim 14 (previously presented) A sensor according to claim 12, wherein said at least one North magnetized region and said at least one South magnetized region are configured to cause changes in said Hall effect sensor outputs at a first rate with movement of a first region of said magnet relative to said sensor and to cause changes in said Hall effect sensor outputs at a second rate greater than said first rate with movement of a second region of said magnet relative to said sensor.

Claim 15 (cancelled)

Claim 16 (cancelled)

Claim 17 (withdrawn) A non-contact position sensor comprising:
a housing, a circuit board disposed in said housing, and a plurality of Hall effect sensors configured in an array on said circuit board; each said Hall effect sensor configured to provide an

output associated with each of a plurality of positions a magnet relative to said position sensor, whereby a separate combination of said outputs is provided for each of said positions.

Claim 18 (withdrawn) A sensor according to claim 17, said sensor further comprising a biasing magnet mounted in a fixed position adjacent at least one of said Hall effect sensors for biasing said at least one of said Hall effect sensors to a selected output state.

Claim 19 (withdrawn) A sensor according to claim 17, wherein said array is a linear array.

Claim 20 (withdrawn) A sensor according to claim 19, wherein each said Hall effect sensor is configured to provide an associated output in response movement of said magnet along said linear array to each of said plurality of positions.

Claim 21 (withdrawn) A sensor according to claim 19, wherein each said Hall effect sensor is configured to provide an associated output in response to movement of said magnet across said linear array to each of said plurality of positions.

Claim 22 (withdrawn) A sensor according to claim 17, wherein said array is an arcuate array.

Claim 23 (withdrawn) A sensor according to claim 17, wherein said magnet has a generally arcuate shape.

Claim 24 (withdrawn) A sensor according to claim 23, wherein said array is a linear array.

Claim 25 (withdrawn) A sensor according to claim 17, wherein said magnet, said circuit board, and said housing have a generally arcuate shape.

Claim 26 (withdrawn) A sensor according to claim 17, wherein said magnet has a length greater than a distance between adjacent ones of said Hall effect sensors.

Claim 27 (withdrawn) A sensor according to claim 17, wherein said housing comprises a top portion having slots, each of said slots receiving an associated one of said Hall effect sensors.

Claim 28 (withdrawn) A sensor according to claim 17, wherein said magnet is a coded magnet comprising at least one North magnetized region and at least one South magnetized region.

Claim 29 (withdrawn) A sensor according to claim 28, wherein said coded magnet comprises adjacent ones of said at least one North magnetized region and said at least one South magnetized region.

Claim 30 (withdrawn) A sensor according to claim 28, wherein said at least one North magnetized region and said at least one South magnetized region are configured to cause changes

in said Hall effect sensor outputs at a first rate with movement of a first region of said magnet relative to said sensor and to cause changes in said Hall effect sensor outputs at a second rate greater than said first rate with movement of a second region of said magnet relative to said sensor.

Claim 31 (withdrawn) A sensor according to claim 17, wherein at least one of said Hall effect sensors comprises first and second Hall elements; each of said Hall elements providing an associated output in response to a position of said sensor control element relative to said position sensor.

Claim 32 (withdrawn) A non-contact position sensor system comprising:

a magnet;

a position sensor mounted in a fixed position relative to said magnet, said position sensor comprising a plurality of Hall effect sensors configured in an array on said circuit board; each of said Hall effect sensors configured to provide an associated output in response to a magnetic field of said magnet; and

a shunt configured to block said magnetic field from a plurality of combinations of said Hall effect sensors, each of said combinations being associated with a different position of said shunt relative to said magnet, whereby said outputs are collectively representative of an associated one of said positions.

Claim 33 (withdrawn) A system according to claim 32, said system further comprising a U-shaped housing comprising first and second opposed legs and an opening between said first

and second legs for receiving said shunt, and wherein said magnet is disposed in said first leg and said Hall effect sensors are disposed in said second leg.

Claim 34 (withdrawn) A system according to claim 33, said system further comprising a generally U-shaped concentrator having first and second opposed concentrator legs, said first concentrator leg being disposed in said first leg of said housing and said second concentrator leg being disposed in said second leg of said housing, said concentrator thereby providing a flux path for a magnetic field of said magnet from said first housing leg to said second housing leg.

Claim 35 (withdrawn) A system according to claim 32, said system further comprising a biasing magnet mounted in a fixed position adjacent at least one of said Hall effect sensors for biasing said at least one of said Hall effect sensors to a selected output state.

Claim 36 (withdrawn) A system according to claim 32, wherein said Hall effect sensors are configured in a linear array.

Claim 37 (withdrawn) A system according to claim 32, wherein at least one of said Hall effect sensors comprises first and second Hall elements; each of said Hall elements providing an associated output in response to a position of said sensor control element relative to said position sensor.

Claim 38 (withdrawn) A system according to claim 32, wherein said shunt has a generally arcuate shape.

Claim 39 (withdrawn) A non-contact position sensor system comprising:

a magnet;

a position sensor mounted in a fixed position relative to said magnet, said position sensor comprising a first plurality of Hall effect sensors configured in a first array and a second plurality of Hall effect sensors configured in a second array; each of said first and second pluralities of Hall effect sensors configured to provide an associated output in response to a magnetic field of said magnet; and

a first shunt configured to block said magnetic field from a plurality of combinations of said first plurality of Hall effect sensors, each of said combinations of said first plurality of Hall effect sensors being associated with a different position of said first shunt relative to said magnet, whereby said outputs of said first plurality of said Hall effect sensors are collectively representative of an associated one of said positions of said first shunt; and

a second shunt configured to block said magnetic field from a plurality of combinations of said second plurality of Hall effect sensors, each of said combinations of said second plurality of Hall effect sensors being associated with a different position of said second shunt relative to said magnet, whereby said outputs of said second plurality of said Hall effect sensors are collectively representative of an associated one of said positions of said second shunt.

Claim 40 (withdrawn) A system according to claim 39, wherein said position sensor comprises a W-shaped housing comprising a middle leg, first and second outside legs, a first opening between said middle leg and said first outside leg for receiving said first shunt, and a second opening between said middle leg and said second outside leg for receiving said second

shunt, and wherein said magnet is disposed in said middle leg, said first plurality of Hall effect sensors are disposed in said first leg, and said second plurality of Hall effect sensors are disposed in said second leg.

Claim 41 (withdrawn) A system according to claim 39, wherein said first shunt comprises first and second separate portions.

Claim 42 (withdrawn) A system according to claim 39, wherein said first and second arrays are linear arrays.

Claim 43 (withdrawn) A system according to claim 39, wherein at least one of said Hall effect sensors comprises first and second Hall elements; each of said Hall elements providing an associated output in response to a position of said sensor control element relative to said position sensor.

Claim 44 (withdrawn) A system according to claim 39, wherein at least one of said first and second shunts has a generally arcuate shape.

Claim 45 (withdrawn) A method of sensing vehicle seat position comprising:
providing a magnet;
providing a position sensor comprising a plurality of Hall effect sensors configured in an array; each said Hall effect sensor configured to provide an output associated with each of a

plurality of positions of said magnet relative to said position sensor, whereby a separate combination of said outputs is provided for each of said positions;

mounting said position sensor and said magnet in said vehicle for relative non-contacting movement therebetween with movement of said seat; and

determining a position of said seat in response to said separate combinations of outputs.

Claim 46 (withdrawn) A method according to claim 45, wherein said array is a linear array, and wherein said position sensor and said magnet are mounted in said vehicle for substantially parallel movement of said magnet relative to said linear array.

Claim 47 (withdrawn) A method according to claim 45, wherein said array is a linear array, and wherein said position sensor and said magnet are mounted in said vehicle for substantially perpendicular movement of said magnet relative to said linear array.

Claim 48 (withdrawn) A method according to claim 45, wherein said magnet is a coded magnet comprising at least one North magnetized region and at least one South magnetized region.

Claim 49 (withdrawn) A method according to claim 48, wherein said coded magnet comprises adjacent ones of said at least one North magnetized region and said at least one South magnetized region.

Claim 50 (withdrawn) A method according to claim 48, wherein said at least one North magnetized region and said at least one South magnetized region are configured to cause changes in said Hall effect sensor outputs at a first rate with movement of a first region of said magnet relative to said sensor and to cause changes in said Hall effect sensor outputs at a second rate greater than said first rate with movement of a second region of said magnet relative to said sensor.

Claim 51 (withdrawn) A method according to claim 45, said method further comprising providing a biasing magnet in a fixed position adjacent at least one of said Hall effect sensors for biasing said at least one of said Hall effect sensors to a selected output state.

Claim 52 (withdrawn) A method of sensing vehicle seat position comprising:
providing a magnet;
providing a position sensor comprising a plurality of Hall effect sensors configured in an array; each of said Hall effect sensors configured to provide an associated output in response to a magnetic field of said magnet;

providing a shunt configured to block said magnetic field from a plurality of combinations of said Hall effect sensors, each of said combinations being associated with a different position of said shunt relative to said magnet, whereby said outputs are collectively representative of an associated one of said positions;

mounting said position sensor in fixed relation to said magnet in said vehicle for non-contacting relative movement between said shunt and said sensor and said magnet with movement of said seat; and

determining said vehicle seat position in response to said outputs.

Claim 53 (withdrawn) A method according to claim 52, said method further comprising providing a biasing magnet in a fixed position adjacent at least one of said Hall effect sensors for biasing said at least one of said Hall effect sensors to a selected output state.

Claim 54 (withdrawn) A method according to claim 52, said method further comprising providing a U-shaped housing comprising first and second opposed legs and an opening between said first and second legs for receiving said shunt, and wherein said magnet is provided in said first leg and said Hall effect sensors are provided in said second leg.

Claim 55 (withdrawn) A method according to claim 54, said method further comprising providing a generally U-shaped concentrator having first and second opposed concentrator legs, said first concentrator leg being disposed in said first leg of said housing and said second concentrator leg being disposed in said second leg of said housing, said concentrator thereby providing a flux path for a magnetic field of said magnet from said first housing leg to said second housing leg.

Claim 56 (withdrawn) A system for determining vehicle seat position comprising:
sensor means for providing a plurality outputs in separate combinations; and
control element means for controlling said outputs to provide one of said combinations for each of a plurality of positions of said control element means relative to said sensor means;

Appln. No. 10/038,747

Amdt. dated April 6, 2005

In response to Office action mailed Dec. 6, 2004

said sensor means and said control element means being mounted in said vehicle for non-contacting movement therebetween with movement of said vehicle seat, whereby each of said separate combinations is associated with a different position of said vehicle seat.